We claim:

1. A method of characterizing a biological specimen, comprising:

a) grouping a very large first plurality of entities into a second plurality of groups, each group comprising a small number of entities;

b) characterizing each group of entities in the second plurality according to an aspect of the vibrational spectrum of each group; and

c) statistically analyzing the characteristics of the groups of entities in the second plurality.

2. The method of claim 1, wherein the small number is preponderantly one.

3. The method of claim 1, wherein the entities are cells.

4. The method of claim 1, wherein characterization of each group is the recording of infrared absorption spectra of the entities in each group.

5. The method of claim 4, wherein the small number is preponderantly one, and wherein the entities are cells, and wherein the infrared absorption spectrum of each cell is analyzed for indications that the one cell in each group is in a cell division stage.

6. The method of claim 5, wherein the results of the statistical analysis is the percentage of the cells in the cell division stage.

7. The method of claim 5, wherein the indication that a cell is in a cell division stage is the presence of a signal indicating DNA in the infrared absorption spectra.

8. The method of claim 4, wherein the small number is preponderantly one, and wherein entities are grouped according to the fluorescence of the entities in each group.

9. A microscope, comprising:

infrared optics for imaging infrared light transmitted through a large number of entities on an area of a microscope stage on to a first detector, where the first detector is an infrared array detector; and

optics for imaging fluorescence light emitted by the entities on to a second detector, where the second detector is a fluorescence light array detector.

10. The microscope of claim 9, further comprising:

a first source of infrared light, the infrared light for illuminating the area of the stage;

an second source of ultraviolet light, the ultraviolet light for illuminating the area of the stage.

11. The microscope of claim 10, wherein:

the first detector is an infra-red area array detector for detecting an image of the entities formed by the infrared light transmitted through the entities;
and the second detector is an area array detector for detecting an image of the entities formed by the fluorescence light emitted by the entities.

12. The microscope of claim 11, wherein the entities are single cells.

13. The microscope of claim 12, wherein the infrared absorption spectra of each cell is recorded.

14. The microscope of claim 13, wherein the infrared absorption spectrum of each cell is analyzed for indications that the cell is in a cell division stage.

15. The microscope of claim 14, wherein the percentage of the cells in the cell division stage is calculated.

16. The microscope of claim 14, wherein the indication that a cell is in a cell division stage is the presence of a signal indicating DNA in the infrared absorption spectra.

17. An apparatus, comprising:

location means for locating a very large number of cells;

vibrational spectrum characterization means for characterizing the vibrational spectrum of each of the cells located by the location means.

18. The apparatus of claim 17, wherein the vibrational spectrum characterization means comprises a means for generating and for transmitting infrared light through each cell.

19. The apparatus of claim 18, wherein the means for generating infrared light comprises a first laser having a first defined infrared wavelength.

20. The apparatus of claim 19, wherein the first laser is pulsed when the location means locates a first cell in a position to be characterized by the first laser.

21. The apparatus of claim 19, wherein the first defined wavelength comprises a wavelength wherein DNA is highly absorbing.

22. The apparatus of claim 21, wherein a second laser having a second infrared wavelength is pulsed to characterize the first cell, wherein the second infrared wavelength comprises a wavelength wherein RNA is highly absorbing

23. The apparatus of claim 20, wherein the first defined wavelength comprises a wavelength wherein DNA is highly absorbing.

24. The apparatus of claim 18, wherein the means for generating infrared light comprises a third laser having a broad band infrared wavelength range.

25. The apparatus of claim 24, wherein the third laser is pulsed when the location means locates a first cell in a position to be characterized by the laser.

26. The apparatus of claim 25, wherein the broad band infrared wavelength range includes a wavelength wherein DNA is highly absorbing.

27. The apparatus of claim 26, wherein the broad band infrared wavelength range includes a wavelength wherein RNA is highly absorbing.

28. The apparatus of claim 27, wherein the infrared absorption spectrum of each cell is recorded.

29. The apparatus of claim 28, wherein the infrared absorption spectrum of each cell is analyzed for indications that the cell is in a cell division stage.

30. The apparatus of claim 29, wherein the percentage of the cells in the cell division stage is calculated.

31. The apparatus of claim 30, wherein the indication that a cell is in a cell division stage is the presence of a signal indicating DNA in the infrared absorption spectra.

33. The apparatus of claim 17, wherein the location means is a fluorescence activated sorting apparatus

34. A method of characterizing a large group of biological cells, comprising:

a) separating the cells so that the cells of the large group are preponderantly separated from each other;

b) characterizing each cell according to an aspect of the vibrational spectrum each cell; and

c) statistically analyzing the characteristics of the groups cells.

35. The method of claim 34, wherein the vibrational spectrum of each cell is the recording of an infrared absorption spectrum for each cell.

36. The method of claim 35, wherein the infrared absorption spectrum of each cell is analyzed for indications that the cell is in a cell division stage.

37. The method of claim 36, wherein the results of the statistical analysis is the percentage of the cells of the group which are in a cell division stage.

38. The method of claim 37, wherein the indication that a cell is in a cell division stage is the presence of a signal indicating DNA in the infrared absorption spectra.

39. The method of claim 38, wherein the separated cells are located according to the fluorescence of the cells.